MIGRATION GUIDE

Migrating SAP ERP 6.0 and IBM DB2 LUW version 9.1 from Solaris 10 Enterprise on Sun Fire T2000 to Red Hat Enterprise Linux Advanced Platform for SAP applications on IBM System x3650 M2 with Intel® Xeon® processors

Principled Technologies®

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IBM

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Introduction

What drives an organization's decision to migrate an SAP® ERP using the SAP NetWeaver® kernel and IBM® DB2 environment from Solaris™ on Sun Fire™ to Red Hat® Enterprise Linux® Advanced Platform for SAP applications on an IBM System x®3650 M2 with two Intel® Xeon® Processor X5570s? The following factors are key:

- the desire for a platform with a stable roadmap
- high performance per core
- energy savings potential
- integrated virtualization technology
- consolidation potential, and
- flexibility for future growth.

In this document, Red Hat Enterprise Linux refers to version 5.4 unless specified otherwise.

Principled Technologies (PT) has performed hands-on testing and research and drawn on real-world experiences to document best practices and help systems administrators and database administrators simplify operations and take advantage of the features of Red Hat Enterprise Linux Advanced Platform for SAP applications.

Red Hat Enterprise Linux Advanced Platform for SAP applications and the IBM System x3650 M2 with the Intel Xeon Processor X5570 make an excellent platform for upgrading SAP systems from Solaris 10 running on legacy Sun Fire.

Scope of this guide

This migration guide reviews the approach that Principled Technologies recommends for migrating the central instance of an SAP system from the Solaris operating system for SPARC-based systems (64-bit) (Solaris 10) to Red Hat Enterprise Linux Advanced Platform for SAP applications for x86-64-based systems. We cover installing Red Hat Enterprise Linux Advanced Platform for SAP applications on the IBM System x3650 M2 and migrating an SAP applications system from the Sun Fire to the IBM System x3650 M2.

Red Hat Enterprise Linux Advanced Platform for SAP applications and the IBM System x3650 M2 with Intel Xeon processors

Red Hat Enterprise Linux defined

Red Hat Enterprise Linux uses an open source development model that delivers enhanced capabilities and new levels of performance, scalability, and security for commercial computing deployments.

In contrast to a perpetual right-to-use license for the software, with additional fees for per-user connectivity (such as Client Access Licenses), maintenance, and upgrades to new versions, the Red Hat Enterprise Linux model simplifies budgeting and reduces unexpected costs.

The software source code for Red Hat Enterprise Linux is open source, mostly under the General Public License (GPL), and is freely downloadable. Red Hat Enterprise Linux is sold on a per-system, all-inclusive annual subscription basis that provides the following:

- Code binaries and documentation
- Product maintenance, product updates, and product support
- Support for seven years from product release, with new releases every 18 to 24 months
- Stable programming interfaces for all User Mode, mainline Kernel Mode application, application programming interfaces (APIs), and application binary interfaces (ABIs) during the life of each release
- Version independence and architecture independence: Red Hat Enterprise Linux subscriptions are transferable across physical systems and architectures (with the exception of mainframe and IBM Power subscriptions).

The Red Hat Enterprise Linux subscription model does not require Client Access Licenses. For a full description of Red Hat Enterprise Linux subscriptions, see www.redhat.com.

Red Hat Enterprise Linux Advanced Platform for SAP applications defined

Red Hat Enterprise Linux Advanced Platform for SAP applications provides an integrated server and storage virtualization environment for customers who choose to run their SAP applications on Linux, offering high levels of deployment flexibility

and application availability. The ability to perform logical volume management and share file systems across multiple virtualized servers and physical systems provides the foundation for a seamless computing grid.

Red Hat Enterprise Linux Advanced Platform for SAP applications provides a powerful combination of features, including the following:

- Integrated JAVA JDK as required by SAP
- High-availability event-driven failover triggers for SAP applications in high-availability clusters
- compat-locales-sap sorting packages for migrating non unicode data sets from UNIX platforms as well as English and German locales for support for migrating existing Microsoft Windows servers

Like the rest of the Red Hat Enterprise Linux product family, Red Hat Enterprise Linux Advanced Platform for SAP applications is a powerful open source solution that delivers value and flexibility available as a complete, fully inclusive per-system annual subscription.

IBM System x3650 M2 with Intel Xeon processors 5500 series defined

The IBM System x3650 M2 is IBM's latest two-socket server platform featuring Intel Xeon processor 5500 series. Find more at www.ibm.com/systems/x/hardware/

- The IBM System x3650 M2 is a 2U, two-processor rack server solution built on IBM X-Architecture®.
- The system features the Intel Xeon Processor 5500 series with innovations including Intel QuickPath Interconnect (QPI), Turbo Boost Technology, and Intelligent Power Technologies.
- The system delivers performance, energy-efficiency, and virtualization for dynamic and demanding enterprise workloads such as SAP deployments.
- In July of 2009, IBM announced that the IBM System x3650 M2 delivers the highest two-processor performance and overall best price/performance on the TPC Benchmark E (TPC-E), twice that of the highest-scoring, previous-generation two-processor systems. The TPC-E is an online

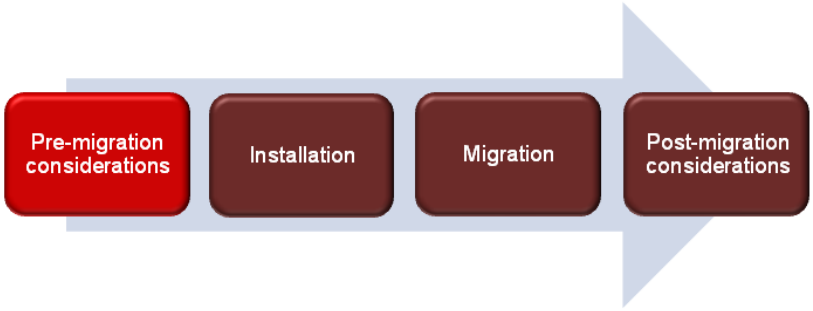
transaction processing (OLTP) workload that uses a mixture of read-only and update-intensive transactions that simulate the activities of complex OLTP application environments.[1]

The IBM System x3850 M2 is a constant in this guide because it is an excellent choice for the database instance server. Although the IBM System x3850 M2 was not the target of our migrations, its strengths deserve mention here. Built with IBM X-Architecture technology, the IBM System x3850 M2 is a 4U, four-processor rack server available with up to four Intel Xeon processor 7400 series. The IBM System x3850 M2 delivers great reliability, with an easy upgrade path providing the necessary flexibility to deliver an optimized solution for scale up databases, enterprise applications, and server consolidation through virtualization services. The IBM System x3850 M2 has proven its raw performance by setting records in industry-standard benchmarks such as SPECint_rate2006 and the SAP SD benchmark.

For more information on IBM's Enterprise server offerings, see www-03.ibm.com/systems/x/hardware/enterprise/

[1] The IBM System x3650 M2's TPC-E result was achieved using Microsoft SQL Server 2008 Enterprise x64 Edition and Microsoft Windows Server 2008 Enterprise x64 Edition. The IBM System x3650 M2 server was configured with the Quad-Core Intel Xeon Processor X5570 at 2.93GHz with 256KB L2 cache per core and 8MB L3 cache per processor (2 processors/8 cores/16 threads). (ftp://ftp.software.ibm.com/eserver/benchmarks/news/newsblurb_x3650M2_specjenterprise_010710.pdf)

Pre-migration considerations



In this section, we discuss considerations for moving an SAP system. Not all of these considerations apply when only moving the central instance, as we do in this guide.

NOTE: We only discuss moving the central instance for the application server in this guide. A migration that involves moving the database is outside the scope of this guide. Such a migration requires an SAP OS/DB Migration Check. See https://service.sap.com/osdbmigration for more details. (Login required)

Operating system compatibility. When introducing a new application server into your SAP ecosystem, be sure that its operating system is compatible with the other servers running in the ecosystem. For Advanced Business Application Programming (ABAP) servers, such as the ones we are dealing with in this guide, SAP says that all UNIX versions, including Solaris, and all Linux versions SAP supports are 100 percent compatible with each other. For further details, see SAP Note 531069 at https://service.sap.com/sap/support/notes/531069. (Login required)

Hardware differences. The SPARC processors are big-endian, while the Intel Xeon processors are little-endian. However, Red Hat Enterprise Linux Advanced Platform for SAP applications ships the proper sap-locales sorting packages so you will not have any issues with data sorting between the two systems.

NOTE: If you are running a non-unicode SAP system, make sure to install the additional locales with adapted sort orders. We describe how to do this in Appendix A.

Third-party application compatibility and licensing. While you should not have any problem moving your SAP-based applications, you should look carefully at any third-party applications you may

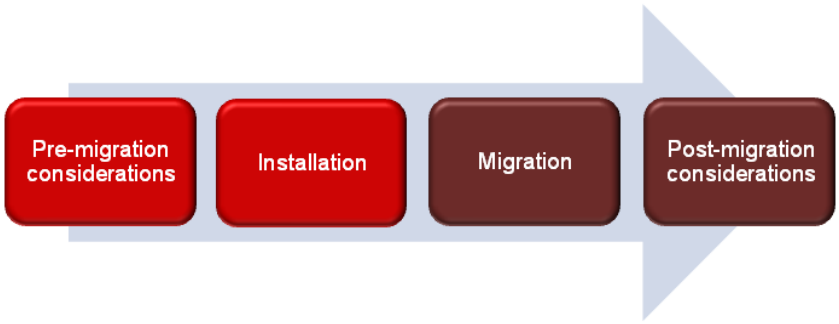
be running on that server. Make sure that the application supports the new environment, or that an acceptable substitute is available, and evaluate any changes to licenses that the move may incur.

System Landscape Directory (SLD) availability. The configuration in this guide assumes that SAP Solution Manager is not running on the system you are migrating. So, in this scenario, SLD data is continuously available. If your central instance server also manages your SLD, the SLD data will be unavailable for a short time. The process of moving the Solution Manager and SLD is outside the scope of this guide.

Scheduling. Be sure to time the migration in such a way that it can complete without disrupting existing service level agreements, maintenance and backup schedules, etc.

Training. The systems administrators and operations staff will need to know how to manage the new operating system environment. Fortunately, there is not a large learning curve between managing Red Hat Enterprise Linux and managing Solaris, so little training is required to move from one environment to the other.

Installing and setting up Red Hat Enterprise Linux Advanced Platform for SAP applications and SAP ERP 6.0 in this environment



Defining our environment

Our legacy server was a Sun Fire T2000 running Solaris 10 5/09 operating system for SPARC-based systems (64-bit). Our destination server was an IBM System x3650 M2 running Red Hat Enterprise Linux Advanced Platform for SAP applications. We connected all components via a Cisco Catalyst 2948-G switch. Figure 1 illustrates our setup.

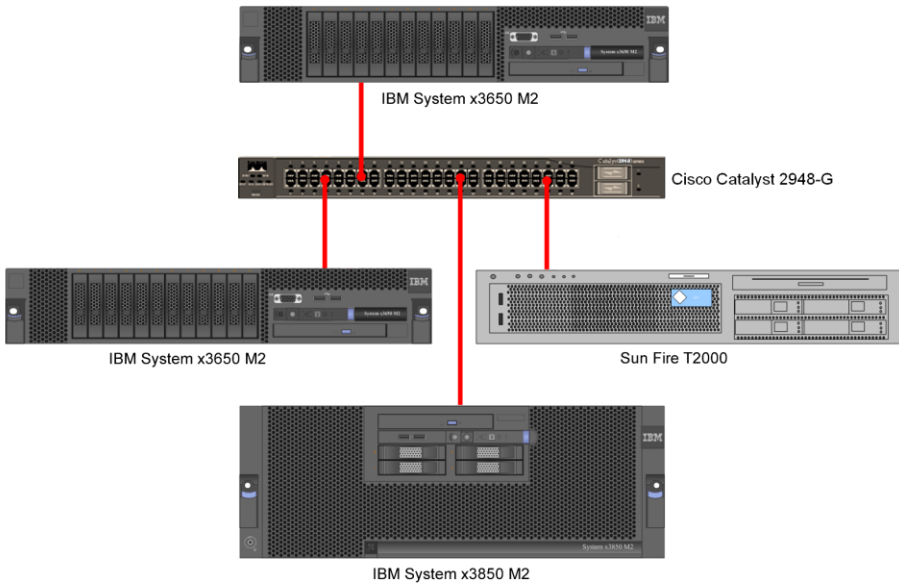


Figure 1. The setup we used in our hands-on testing and research for this migration guide.

Figures 2 and 3 present the hardware and software we used in our

Solaris 10 and Red Hat Enterprise Linux Advanced Platform for SAP applications servers.

Server	Processor	Memory	Disk
Sun Fire T2000 (legacy server)	1 x UltraSPARC™ T1 1.2 GHz	32 GB	4 x Fujitsu® Ultra320 SCSI, 73 GB
IBM System x3650 M2 (Solution Manager/SLD server and migration server)	2 x Intel Xeon Processor X5570 (4-core, 2.93 GHz, 8MB L3 cache)	32 GB	6 x IBM SAS, 10K, 300 GB
IBM System x3850 M2 (database layer server)	2 x Intel Xeon Processor X7460 (6-core, 2.66 GHz, 12MB L3 cache)	32 GB	4 x IBM SAS, 10K, 146 GB

Figure 2. Servers we used in our hands-on testing and research for this guide.

Server	Server operating system
Sun Fire T2000 (legacy server)	Sun Solaris 10 5/09 operating system for SPARC-based systems (64-bit)
IBM System x3650 M2 (Solution Manager/SLD server and migration servers) and IBM x3850 M2 (database server)	Red Hat Enterprise Linux Advanced Platform for SAP applications for x86-64

Figure 3. Software we used in our hands-on testing and research for this guide.

For all servers, we used SAP ERP 6.0 (ERP) with the NetWeaver 7.01 kernel and IBM DB2 LUW version 9.1.

We also used a Cisco Catalyst 2948-G switch.

BEST PRACTICE: Use the latest tested and validated software, firmware, and driver versions for NICs, storage arrays, and other components. Red Hat Network (RHN) allows you to easily update your packages and receive security notices customized for your system.

See www.redhat.com/red_hat_network/ for details.

Red Hat releases errata to address bugs, provide enhancements, and to fix security vulnerabilities. With each erratum, Red Hat supplies an advisory to give details of the issues being fixed as well as how to obtain and install the required software packages. Links to the advisories for the products can be found here: www.redhat.com/security/updates/

Installing Red Hat Enterprise Linux Advanced Platform for SAP applications

This section provides an overview of the operating system installation process. (Appendix A provides complete, detailed installation instructions.)

Installing Red Hat Enterprise Linux Advanced Platform for SAP applications involves three major steps. The first is installing Red Hat Enterprise Linux. The second is subscribing to the Red Hat Enterprise Linux Advanced Platform for SAP applications channel via Red Hat Network. The third is using the yum Update Manager utility to upgrade your system with all the latest packages.

We downloaded the operating system from rhn.redhat.com and burned it to a DVD, from which we installed it. You must register with Red Hat Network to download the operating system. The following instructions assume you have a valid installation number.

In the first part of this section, we discuss installing the base Red Hat Enterprise Linux operating system. In the second part, we discuss subscribing to the Red Hat Enterprise Linux Advanced Platform for SAP applications channel and installing the RPMs needed to complete the installation of Red Hat Enterprise Linux Advanced Platform for SAP applications.

Installing Red Hat Enterprise Linux

1. Insert the Red Hat Enterprise Linux DVD into the DVD drive and reboot the system. When the installer prompts you, press Enter to install in graphical mode (Figure 4).

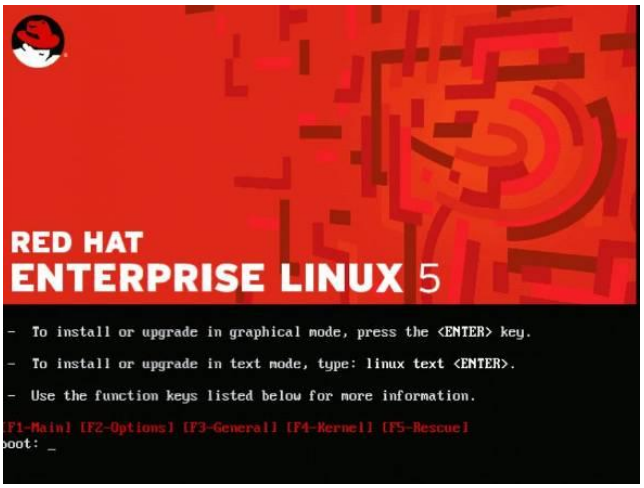

RED HAT
ENTERPRISE LINUX 5
- To install or upgrade in graphical mode, press the <ENTER> key.
- To install or upgrade in text mode, type: linux text <ENTER>.
- Use the function keys listed below for more information.
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: _

Figure 4. Selecting your install mode.

2. Select English as the language and U.S. English as the default keyboard.
3. Enter your installation number.
4. Accept the default of installing Red Hat Enterprise Linux, and let the installer remove the Linux partition and create a default layout (Figure 5).

RED HAT
ENTERPRISE LINUX 5
The GRUB boot loader will be installed on /dev/sda.
No boot loader will be installed.
You can configure the boot loader to boot other operating systems. It will allow you to select an operating system to boot from the list. To add additional operating systems, which are not automatically detected, click 'Add.' To change the operating system booted by default, select 'Default' by the desired operating system.
Default
Label
Device
Red Hat Enterprise Linux Server
/dev/VolGroup00/LogVol00
Add
Edit
Delete
A boot loader password prevents users from changing options passed to the kernel. For greater system security, it is recommended that you set a password.
Use a boot loader password
Change password
Configure advanced boot loader options
Release Notes
Back
Next

Figure 5. Accept default installation locations.

5. Accept the default installation locations for the operation system and boot loader. Increase the default swap size. (Figure 6).

Figure 6. Increase the default swap size.

6. Configure your network information (Figure 7).

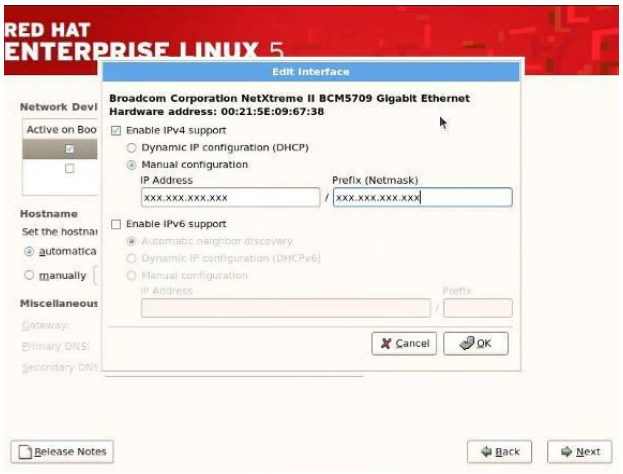


Figure 7. Configure Network Information.

7. Set your time zone, and enter the root password. Click Next to start the installation (Figure 8). The installer should eject the DVD automatically.

RED HAT
ENTERPRISE LINUX 5
Click next to begin installation of Red Hat Enterprise Linux Server.
A complete log of the installation can be found in the file '/root/install.log' after rebooting your system.
A kickstart file containing the installation options selected can be found in the file '/root/anaconda-ks.cfg' after rebooting the system.
Release Notes
Back
Next

Figure 8. Begin Installation.

8. After the reboot, accept the license agreement (Figure 9).

Welcome
License Agreement
Firewall
SELinux
Kdump
Date and Time
Set Up Software Updates
Create User
Sound Card
Additional CDs
License Agreement
END USER LICENSE AGREEMENT
RED HAT® ENTERPRISE LINUX® AND RED HAT APPLICATIONS
This end user license agreement ("EULA") governs the use of any of the versions of Red Hat Enterprise Linux, any Red Hat Applications (as set forth at www.redhat.com/licenses/products), and any related updates, source code, appearance, structure and organization (the "Programs"), regardless of the delivery mechanism.
1. License Grant. Subject to the following terms, Red Hat, Inc. ("Red Hat") grants to you ("User") a perpetual, worldwide license to the Programs pursuant to the GNU General Public License v.2. The Programs are either a modular operating system or an application consisting of hundreds of software components. With the exception of certain image files identified in Section 2 below, the license agreement for each software component is located in the software component's source code and permits User to run, copy, modify, and redistribute (subject to certain obligations in some cases) the software component, in both source code and binary code forms. This EULA pertains solely to the Programs and does not limit User's rights under, or grant User rights that supersede, the license terms of any particular component.
Yes, I agree to the License Agreement
No, I do not agree
Back
Forward

Figure 9. Accept License Agreement.

9. Disable SELinux (Figure 10).

NOTE: Security-Enhanced Linux (SELinux) policies, supported by Red Hat, for SAP applications do exist; however, for the purposes of this guide, we have chosen to disable SELinux. At the time we wrote this guide, SAP did not support running SAP applications with SELinux enabled.

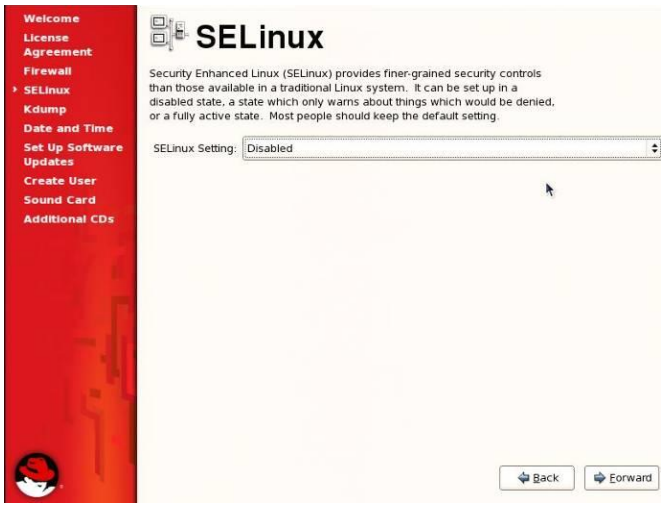

Welcome
License Agreement
Firewall
SELinux
Kdump
Date and Time
Set Up Software Updates
Create User
Sound Card
Additional CDs
SELinux
Security Enhanced Linux (SELinux) provides finer-grained security controls than those available in a traditional Linux system. It can be set up in a disabled state, a state which only warns about things which would be denied, or a fully active state. Most people should keep the default setting.
SELinux Setting:
Disabled
Back
Forward

Figure 10. Disabling SELinux.

10. Set the date and time.
11. Register with RHN. This is necessary to subscribe to the Red Hat Enterprise Linux Advanced Platform for SAP applications channel.
12. Create a user account. Accept the remaining defaults and click Finish to reboot the system. Make sure that the DVD is not in the system.

Subscribing to the Red Hat Enterprise Linux for SAP applications channel and completing the installation.

At this point, you have installed Red Hat Enterprise Linux. To complete installing Red Hat Enterprise Linux Advanced Platform for SAP applications, you need to subscribe to Red Hat Enterprise Linux Advanced Platform for SAP applications channel.

1. Use a Web browser to log into RHN, and select the system you just registered.
2. On the Software tab, select Software Channels (Figure 11).

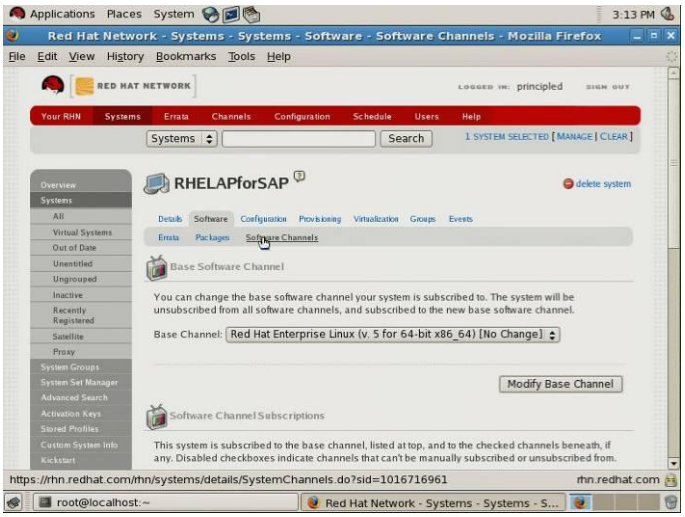

Applications Places System
3:13 PM
Red Hat Network - Systems - Systems - Software - Software Channels - Mozilla Firefox
File Edit View History Bookmarks Tools Help
RED HAT NETWORK
LOGGED IN: principled SIGN OUT
Your RHN Systems Errata Channels Configuration Schedule Users Help
Systems Search
1 SYSTEM SELECTED [MANAGE | CLEAR]
Overview
Systems
All
Virtual Systems
Out of Date
Unentitled
Ungrouped
Inactive
Recently Registered
Satellite
Proxy
System Groups
System Set Manager
Advanced Search
Activation Keys
Stored Profiles
Custom System Info
Kickstart
RHELAPforSAP
delete system
Details Software Configuration Provisioning Virtualization Groups Events
Errata Packages Software Channels
Base Software Channel
You can change the base software channel your system is subscribed to. The system will be unsubscribed from all software channels, and subscribed to the new base software channel.
Base Channel: Red Hat Enterprise Linux (v. 5 for 64-bit x86_64) [No Change]
Modify Base Channel
Software Channel Subscriptions
This system is subscribed to the base channel, listed at top, and to the checked channels beneath, if any. Disabled checkboxes indicate channels that can't be manually subscribed or unsubscribed from.
https://rhn.redhat.com/rhn/systems/details/SystemChannels.do?sid=1016716961
rhn.redhat.com
root@localhost:~
Red Hat Network - Systems - Systems - S...

Figure 11. The RHN Software Channels page.

3. Select Red Hat Enterprise Linux Advanced Platform for SAP applications (v.5 for 64-bit x86_64), and click Change Subscriptions.
4. On your server, use the yum utility to install the packages.

Preparing your system for SAP ERP 6.0

Prior to installing ERP 6.0, you **must** take several steps to prepare the system. Please note these preliminary steps are essential to a proper installation. For more information, see SAP Note 1048303 at https://service.sap.com/sap/support/notes/1048303 (Login required). Appendix B also provides complete, detailed installation instructions.

Configuring the system

1. Make sure the system name is no longer than 13 characters, consisting of only letters, numbers, and hyphens.
2. Make sure your swap space large enough. The amount of swap space the system requires depends on the SAP application components you have installed.
3. Edit your profile and limits to set CPIC_MAX_CONV and hard/soft limits for sapsys and dba.
4. Edit sysctl.config, and verify it contains these settings:
   kernel.msgmni=1024
   kernel.sem=1250 256000 100 1024
   vm.max_map_count=1000000
   kernel.shmmax=23136829430
   kernel.shmall=5242880
   (For further information on how to configure those parameters, see https://service.sap.com/sap/support/notes/941735. Login required.)
5. Reboot the server to make all settings active.
6. Use the hostname command to make sure the system returns only the system name and not a fully qualified domain name.

If you plan to use a remote desktop, use the following two steps:

1. Set Red Hat using System→Preferences→Remote desktop.
2. Set PS1= `<string>` to set prompt.

NOTE: You can access the server remotely using your preferred viewer. In our case, we used the Tight VNC viewer available at www.tightvnc.com/download.html.

Installing Java and the SAP graphical user interface (GUI)

SAP applications only work with, and are only supported by, a specific version of the IBM JDK. The SAP engine requires the IBM

1.4.2 JDK, which you have installed already as part of the yum update process for Red Hat Enterprise Linux Advanced Platform for SAP applications.

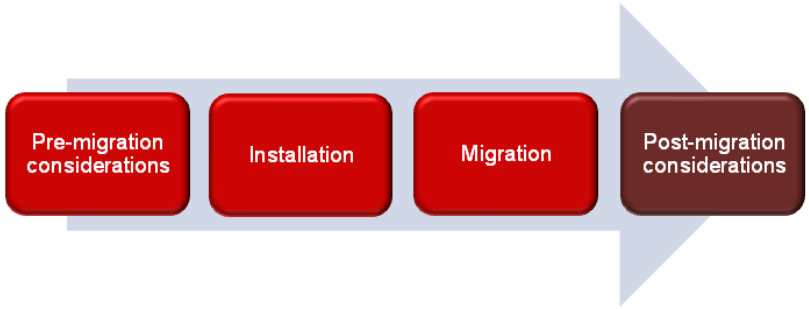
The SAP GUI requires at least Java 1.5 to run. We installed the Java 1.6.0_16 version from Sun.

1. Download the Sun JRE from www.java.com/en/download/manual.jsp.
2. Install the Sun JRE.
3. Set the PATH variable so that the Sun JRE is the default version of Java. You can verify this with the `java –version` command.
4. Install the SAP GUI.

SAP NetWeaver 7.0 requires strong encryption. Although you have already installed the IBM JDK, you still need to obtain and install the Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files for the IBM JDK.

1. Register to download the JCE files at https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=jcesdk and download the ZIP file from https://www14.software.ibm.com/webapp/iwm/web/reg/pick.do?source=jcesdk&lang=en_US.
2. The file you download is named unrestricted.zip. Copy the file named unrestricted.zip to /usr/lib/jvm/java-1.4.2-ibm-1.4.2.13.2.sap.x86_64/jre/lib/security directory.
   Do not unzip the file. Instead, copy the archive.

Migrating the central instance



This procedure assumes that you have a correctly configured and working distributed system based on ABAP, using SAP ERP 6.0 and the 7.01 version of the NetWeaver kernel and IBM DB2 LUW version 9.1. Therefore, we assume that matters such as configuring the firewall to allow the global and profile directories have already been attended to. In particular, we assume that you have Solution Manager installed on a system other than the current central instance server and the system landscape configured.

1. Shut down the running system from the current central instance.
2. Restart the database on the database instance server.
3. Log into the IBM System x3650 M2 using the root account.
4. Create and mount the global and profile directories on the target server.
5. Start SAPinst and select SAP ERP 6.0 EHP4 Ready – Support Release 1→SAP Application Server ABAP→IBM DB2 for Linux, UNIX, and Windows→Distributed System, and choose Central Instance (Figure 12).

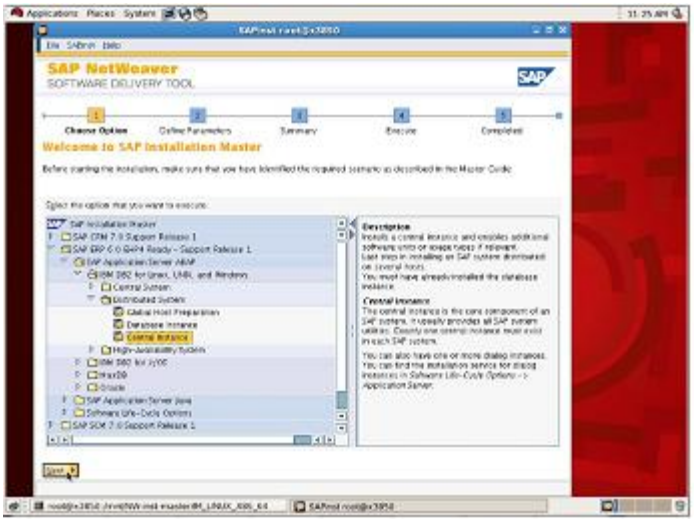


Figure 12. Selecting the central instance.

6. Fill in the information SAPinst requests (Figure 13).

Figure 13. Reviewing the parameter summary.

7. Use Solution Manager to generate the installation key (Figure 14).

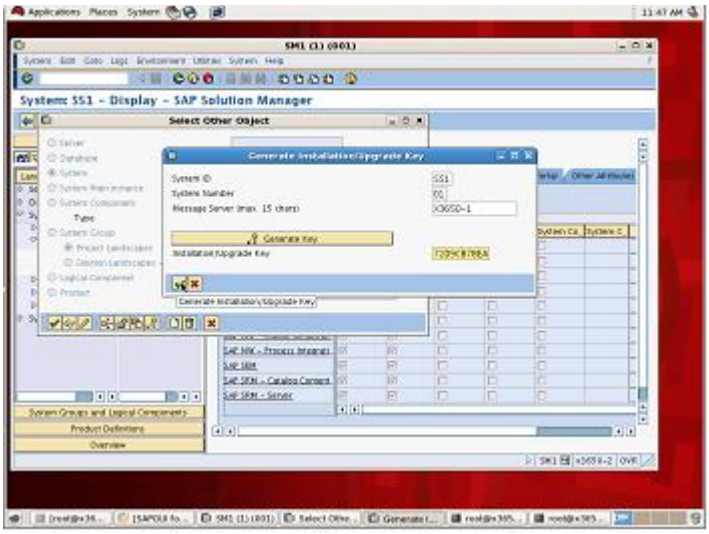
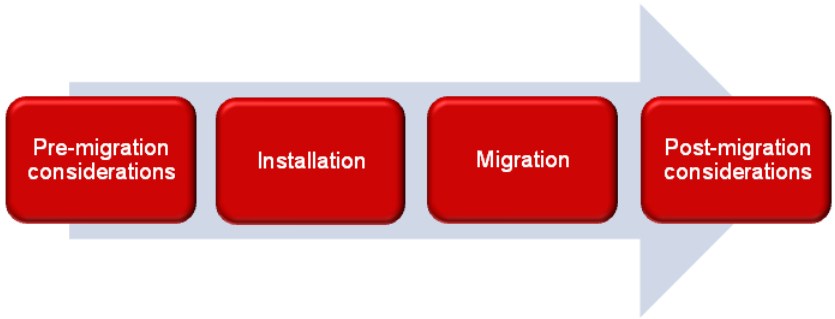


Figure 14. Generating the key.

Post-migration considerations



At this point, your system should be running with no problems. However, below we present some considerations appropriate to migrating an entire SAP system.

Because SAP systems interact with so many components, you must do some configuration once the migration is complete. We list some of the post-migration steps below. However, the exact steps will depend on your specific ecosystem, and may be much more extensive than what we show below.

OS level

- Reconfigure public key certificates so that they are valid for the new system. Import the new certificates to other systems as necessary.
- Make any necessary changes to scripts and system configuration files.
- Check external resources such as system printers and NFS mounts.
- Update software components that the system change affects. These may be SAP components, such as RFC or CPIC, as well as non-SAP software components, such as monitoring tools.

SAP level

- Cancel any scheduled jobs on your source system.
- As we discussed above, you generated an installation key. Install the new key.
- Run an installation check.
- Configure the Transport Management System.

- Delete canceled and finished jobs.
- Move and adapt jobs the target system will need. You may need to delete some old jobs as well.
- Synchronize the buffers and adapt the client information for the logical system.
- For each client in your SAP system, check the detail settings.
- If necessary, set up the trusted and trusting RFC relationships again.
- Define or remove the SAP system users as needed and revise the authorizations of the system users.
- Make data archived in the source system accessible in the target system. This is data that does not reside in the database, and so was not part of the import.
- Check logon groups and assignment of application servers to logon groups.
- Check the logical system names. If you need to change logical system names in the target system, follow your corporate naming strategy.
- Configure the domain controller in the Transport Management System.

Summing up

Red Hat Enterprise Linux Advanced Platform for SAP applications and the IBM System x3650 M2 provide many good reasons to migrate your SAP system. As this guide has explained, the process of deploying these products in this new environment is relatively straightforward; you can perform a basic installation and migration in less than one day. Spending some up-front time planning can help you avoid potential problems during your migration.

Appendix A. Methodology: Installing Red Hat Enterprise Linux Advanced Platform for SAP applications on the IBM System x3650 M2

Install Red Hat Enterprise Linux Advanced Platform for SAP applications by following these steps.

Installing Red Hat Enterprise Linux

The first step in installing Red Hat Enterprise Linux Advanced Platform for SAP applications is to install Red Hat Enterprise Linux. We used Red Hat Enterprise Linux, which we downloaded from rhn.redhat.com and burned to a DVD. You must register with RHN to obtain a valid entitlement and download the operating system; the following instructions assume you have a valid installation number.

NOTE: In this appendix, we use the primary network interface name, which in our case was eth0. You should use the name of the primary network interface that you encounter, which may differ slightly from what we present here.

1. Reboot, and wait for the GNU GRUB boot screen to appear.
2. Press Enter to install in graphical mode.

NOTE: We chose to skip the media test, but that is your choice.

3. Click Next at the splash screen.

NOTE: Although we are installing Red Hat Enterprise Linux Advanced Platform for SAP applications, the splash screen says Red Hat Enterprise Linux 5. This is expected.

4. Accept the default of English to use as the language during the installation, and click Next.
5. Accept the default of U.S. English as the appropriate keyboard for the system, and click Next.
6. Enter your installation number, and click Next.

NOTE: The default swap size will almost certainly be too small for your SAP installation. In the instructions below, we use a swap size of 66,560 MB. However, the exact size of the swap size you require will depend on the SAP components you install.

7. For each drive, ignore the warning "The partition table of sd<x> was unreadable." Click YES to the warning about erasing all data.
8. On the next screen, choose Remove all partitions on selected drives and create default layout. Then, check Review and modify partitioning layout. Click Next.
9. At the warning, click Yes.
10. Review, and click Next.
11. On the partition and modify review screen, highlight your main partition, and click Edit.
12. Select your root volume (largest volume by default), and click Edit.
13. Reduce size by 66,560 MB to increase the swap space, and click OK.
14. Select swap volume, and click Edit.
15. Change size to 66,560 MB, and click OK.
16. On the Edit Volume screen, click OK.
17. Click Next to continue installation.
18. We followed best practices and set fixed IP addresses for the NIC.
19. If appropriate, select Active on Boot. The NIC eth0 must be active on boot, and that is its default. The default for all other NICs is not to be active on boot.
20. Select the NIC, and click Edit.
21. Click Manual configuration.
22. Enter the IP address.
23. Enter the subnet mask.
24. De-select Enable IPv6 Support.
25. Click OK.
26. Set the hostname and domain manually. To comply with SAP requirements, make sure the system name is no longer than 13 characters, consisting only of letters, numbers, and hyphens.
27. Under Miscellaneous settings, enter the IP addresses for the Gateway, Primary DNS, and Secondary DNS. Click Next.
28. Accept the default of Eastern Time for the time zone, and click Next.

NOTE: This appendix details the exact steps we used. Of course, you may choose any time zone.

29. Enter the root password, and click Next.
30. Accept the default of Customize later, and click Next.
31. Click Next.

32. When prompted, verify that the install ejected the DVD, and click Reboot.
33. After the reboot, click Forward at the Welcome screen.
34. Accept the license agreement, and click Forward.
35. Configure the firewall according to your corporate security policy.
36. Use Disabled for the SELinux state. (While there are supported SELinux policies for SAP applications, for the purposes of this guide, we have chosen to disable SELinux.) Click Forward.
37. When a warning that changing the SELinux setting requires rebooting the system appears, click Yes.
38. Accept the default of Kdump not being enabled, and click Forward.
39. Set the date and time, and click Forward.
40. In order to complete the installation of Red Hat Enterprise Linux Advanced Platform for SAP applications, you will need to register with RHN. Accept the default of Yes, I'd like to register now, and click Forward.
41. On the Choose server screen, we accepted the default of I'd like to receive updates form Red Hat Network. However, if your organization uses a proxy, you would specify it here. Click Forward.
42. On the Red Hat login screen, specify your account name and password, and click Forward.
43. On the Finish Updates Setup screen, click Forward.
44. On the Create Profile screen, fill in the System name. (It defaults to the IP address of the server.) Accept the defaults of sending the hardware profile and the package profile, and click Forward.
45. On the Review Subscription, check your information, and click Forward.
46. On the Finish Updates Setup screen, click Forward.
47. Create a regular user account, filling in the username, full name, and password.
48. On the Sound Card screen, click Forward.
49. On the Additional CDs screen, click Finish.
50. Click OK on System Reboot Message and the system will reboot. Make sure the installation DVD is not in the system.

Subscribing to the Red Hat Enterprise Linux Advanced Platform for SAP applications channel

At this point, you have installed Red Hat Enterprise Linux. To complete installing Red Hat Enterprise Linux Advanced Platform for SAP applications, you need to subscribe to the Red Hat Enterprise Linux Advanced Platform for SAP applications channel.

1. Using a browser, log into RHN.
2. On the Your RHN page, select Systems.
3. On the System Overview page, select the system you just registered.
4. On the page for your system, select the Software tab, and select Software Channels.
5. Scroll down to the Channel Entitlement section of the page and select Red Hat Enterprise Linux Advanced Platform for SAP applications (v.5 for 64-bit x86_64). Click Change Subscriptions.
6. On your server, use the command `yum repolist` to verify that the subscription was successful.
7. Use these commands to install the following packages:
   - To install the IBM JDK, type `yum install java-1.4.2-ibm*`
   - If you are running a non-unicode SAP system, make sure to install the additional locales with adapted sort orders as well. Type `yum install compat-locales-sap-common.noarch`

Appendix B. Methodology: Preparing the system for SAP ERP 6.0

1. Ping the host name for the server, and verify that the IP address is not the loopback address (127.0.0.1). If it is, edit the /etc/hosts file, and set it to the correct IP address.
2. If you are installing the SAP software on a pre-configured system, you may need to increase the swap size. Because the disk is already partitioned in this case, use the following commands to create the swap file:

```
dd if=/dev/zero of=/swapfile bs=1K count=66560000
mkswap /swapfile
swapon /swapfile
```

NOTES: As we mentioned earlier, the exact amount of swap space will depend on the SAP components you install.

If you want, you can use the swapoff command to turn off the swap file partition.

- Edit /etc/fstab.
- Add the following line:

```
/swapfile   none   swap   defaults  0 0
```

- Use `swapon -s` to verify the swap is active.

3. Edit the file /etc/profile, and add the following line:

```
CPIC_MAX_CONV=200; export CPIC_MAX_CONV
```

4. Set hard and soft nofile in /etc/security/limits.conf by adding the following lines:

```
@sapsys    hard   nofile   32800
@sapsys    soft   nofile   32800
@dba       hard   nofile   32800
@dba       soft   nofile   32800
```

5. Verify that /etc/sysctl.conf, contains the following lines:

```
kernel.msgmni=1024
kernel.sem=1250 256000 100 1024
vm.max_map_count=1000000
kernel.shmmax=23136829430
kernel.shmall=5242880
```

6. Reboot to make all the settings active.
7. If you plan on using remote desktop software, you may also complete the following two optional steps:
   a) Set Red Hat using System→Preferences→Remote desktop.
   b) Set PS1= <string>to set prompt.

Installing the Java Cryptography Extension archive

The SAP engine requires the IBM 1.4.2 JDK, which you have installed already as part of the yum update process for Red Hat Enterprise Linux Advanced Platform for SAP applications.

SAP NetWeaver 7.0 requires strong encryption. Although you have already installed the IBM JDK, you still need to obtain and install the Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files for the IBM JDK.

1. Register to download the JCE files at https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=jcesdk and download the ZIP file from https://www14.software.ibm.com/webapp/iwm/web/reg/pick.do?source=jcesdk&lang=en_US.
2. The file you download is named unrestricted.zip. Copy the file unrestricted.zip to /usr/lib/jvm/java-1.4.2-ibm-1.4.2.13.2.sap.x86_64/jre/lib/security directory.
3. Do not unzip the file. Instead, copy the archive.

Installing the SAP GUI

The SAP GUI requires at least Java 1.5 to run. We installed the Java 1.6.0_16 version from Sun.

1. Download the Sun JRE from www.java.com/en/download/manual.jsp.
2. Install the Sun JRE using the following command:
   `rpm –ivh jre-6u16-linux-i586.rpm`.
3. Set the PATH variable so that the Sun JRE is the default version of Java. You can verify this with the command `java –version`

NOTE: SAP recommends that you download the latest version of the SAPGUI from ftp://ftp.sap.com/pub/sapgui/java/. For this guide, we used SAPGUI 7.10 rev 9. The name of the jar file will change based on the version of the GUI and the operating systems. The jar file we used called itself PlatinGUILNX_9.JAR, so that is the name we use in the instructions below.

4. Make sure that the Sun JRE is your default Java. You can use the java –version command for this. For Java 1.6.0_16 version from Sun, you will see the following text:

   java version "1.6.0_16"
   Java(TM) SE Runtime Environment (build 1.6.0_16-b01)

Java HotSpot(TM) Server VM (build 14,2-b01, mixed mode)

5. Install the SAP GUI with the following command:
   `java –jar PlatinGUILNX_9.JAR`
6. Accept the default of /opt/SAPClients for the directory.

Appendix C. Moving the central instance from Solaris 10 on the Sun Fire T2000 to Red Hat Enterprise Linux Advanced Platform for SAP applications on the IBM System x3650 M2

This procedure assumes that you have a correctly configured and working distributed system based on ABAP, using SAP ERP 6.0 and the 7.01 version of the NetWeaver kernel, and that you have followed the preparations detailed above. Therefore, we assume that matters such as configuring the firewall to allow the global and profile directories have already been attended to. In particular, we assume that you have Solution Manager installed and the system landscape configured.

In the description below, we provide names and part numbers of the specific DVDs and CDs we used for this process. For convenience, we copied the ISO images to a file server and mounted them on the target server. However, that does not change the procedures below.

During the course of this migration, you will need the SAP Cryptographic Library. If you do not already have it, you can download it from https://service.sap.com/swdc (Login required). Select Download, and select SAP Cryptographic Software. When we downloaded the version for Linux, its file name was 90000115.SAR.

1. Log into the current central instance server, the Sun Fire T2000, using the <SAPSID>adm account, and perform the following steps:
    a) Use the command cat /etc/group to get the group id for the sapsys group. You will use this later.
    b) Use the command cat /etc/passwd to get the user ID the <SAPSID>adm account. You will use this later.
    c) Type `stopsap all` to shutdown the SAP system. At this point, the T2000 is no longer part of this process.
2. Log into the database instance server, the IBM x3850 M2, using the <SAPSID>adm account:
    a) Type `stopdb` to shutdown the database.
    b) Optionally, make a safe copy of the existing /sapmnt/<SAPSID>/profile directory.
    c) Delete <SAPSID>_DVEBMGS00_<HOSTNAME> and START_DVEBMGS00_<T2000 HOSTNAME> files.

d) Type `startdb` to restart the database. The database must be available for the install of the Central instance to compete.

3. Log into the target server, the IBM x3650 M2, using the root account.

NOTE: If you do not have a time server on your network, make sure that the time on your new central instance server matches the time on you database instance server. If there is a large time difference between the two systems, the installation will fail.

4. Create the sapsys group, using the same group id (or gid) you recorded in Step 1a. It is very important that the gid for the sapsys group be the same as for all servers. Create the sapsys group using the following command: `groupadd -g <GID> sapsys`.

NOTE: Because you are installing on a new system, there should be no user accounts. However, if you have created user accounts before beginning this install, make sure that none of them use the same UID as the <SAPSID>adm account. The UID of that account must be the same on all servers in your distributed system.

5. Create the global and profile directories with the following commands:

```
mkdir  /sapmnt
mkdir  /sapmnt /<SAPSID>
mkdir  /sapmnt /<SAPSID>/global
mkdir  /sapmnt /<SAPSID>/profile
```

6. Set the ownership of these directories with the following command: `chown  -R nobody:sapsys /sapmnt`
7. Mount the global and profile directories you just created. In the two commands below, <HOSTNAME> is the hostname of your Global host.

```
mount -t nfs <HOSTNAME>:/sapmnt/<SAPSID>/global
/sapmnt/<SAPSID>/global
mount -t nfs <HOSTNAME>:/sapmnt/<SAPSID>/global
/sapmnt/<SAPSID>/global
```

8. You will find sapinst, the SAP installation program, on the DVD labeled SAP NetWeaver Installation Master-SR1. Its part number id is 51036888. On that DVD, open a command line prompt in the IM_LINUX_X86_64 directory and use the following command: `./sapinst`.

9. On the Welcome to SAP Installation Master screen, expand the selection tree to SAP ERP 6.0 EHP4 Ready – Support Release 1→SAP Application Server ABAP→IBM DB2 for Linux, UNIX, and Windows→Distributed System, and choose Central Instance. Click Next
10. On the Parameter Mode→Default Setting screen, accept the default of Typical, and click Next.
11. For the Java runtime environment, browse to /usr/lib/jvm/java-1.4.2-ibm-1.4.2.13.2.sap.x86_64, and click Next.
12. For the Profile directory browse to /sapmnt/<SAPSID>/profile, and click Next.
13. Set the Master Password according to your policies, and click Next.
14. Set the Fully Qualified Domain Name based on your configuration. If you need more information, see SAP note 654982. Click Next.
15. You will find the CLI/JDBC driver on the CD labeled DB2 FOR LUW 9.1 RDBMS FP7 Client. Its part number is 51037092. Browse to the root directory of that CD, and click Next.
16. You will find the UC Kernel on the DVD labeled SAP EHP1 for SAP NETWEAVER 7.0SR1 Kernel 7.01. Its part number is 51036769. Browse to the directory DATA_UNITS/K_701_U_LINUX_X86_64 on that DVD, and click Next.
17. For the SAP Cryptographic Library (SAPCRYPTO.SAR), browse to the archive you downloaded earlier. In our case, its name was 90000115.SAR.
18. On the Parameter Summary screen, carefully review your choices, and click Next.
19. SAPinst will start to install and ask for a key. Leave SAPinst paused while you generate the key in the Solution Manager.
    a) Log into the SAP solution manager. The information for this will be specific to your installation. You will need a privileged account to generate the key. We used the DDIC account.
    b) When the Solution Manager GUI appears, type `SMSY` in the upper left part of the toolbar, and either click the checkmark icon or press Enter.
    c) Under Landscape components, Expand Systems, and expand SAP ERP.
    d) Enter the SAPSID for the system whose central instance you are moving.
    e) From the System menu, chose Select Other Object.

f) Click the Key icon.
g) Fill in the instance number. The SAPinst GUI displays this when it asks for the installation key.
h) For the Message Server, fill in the hostname of the server you are installing on.
i) Click Generate key.

20. Enter the key value in the SAPinst GUI, and click Next.
21. The installation will proceed. Check periodically to see if there are any errors.
22. In the Solution Manager, click Save and close. Note that the Unsaved data will be lost message always appears, even when there is nothing to save.
23. During the installation, you will need to confirm the DDIC password.
24. When the installation completes, you will see a message box saying "Execution of SAP ERP 6.0 EH4 Ready – Support Release 1 > SAP Application Server ABAP > IBM DB2 for Linux, UNIX, and Windows > Distributed System > Central Instance has completed successfully."

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1007 Slater Road, Suite 250
Durham, NC, 27703
www.principledtechnologies.com

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